

**Preliminary Reassessment
of
Known Vulnerabilities
at the
Y-12 Plant**

November 1997

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Executive Summary

As a result of the explosion at the Hanford Plutonium Reclamation Facility on May 14, 1997, Secretary Federico Peña directed the Department of Energy (DOE) Operations Office Managers in an August 4, 1997, letter to implement several broad-based initiatives with the purpose of identifying and preventing similar situations. Four specific initiatives were identified in Secretary Peña's letter. The second initiative, which is the subject of this report, can be summarized as follows:

DOE field offices must reassess known vulnerabilities (chemical and radiological) at facilities that have been shut down or placed in standby mode and facilities in the process of being deactivated. Facility operators must evaluate their facilities and operations for new vulnerabilities on a continuing basis.

This report primarily concentrates on the reassessment of known vulnerabilities. Where appropriate, information on the methods used to identify and control vulnerabilities supplements the reassessment. The year-end progress report, which will address Secretary Peña's remaining initiatives, will more fully discuss the processes utilized to evaluate new vulnerabilities.

Over the past several years, DOE has conducted a series of assessments to identify environmental, safety, and health (ESH) vulnerabilities in areas of chemical, plutonium and highly enriched uranium (HEU) handling, storage and operations. As part of this preliminary reassessment, Y-12 vulnerabilities identified in those assessments have been reviewed. Responses to Defense Nuclear Facilities Safety Board (Defense Board) Recommendations were also included in the scope of the review as well as a review of applicable site and corporate assessments and audits. Information from facility walkdowns will be included in the year-end progress report.

Approximately fifty percent of the vulnerabilities identified in the DOE assessments have been eliminated (roughly fifty percent remain open). Corrective action plans are under way. The status of these activities is included in this report (see Sections 1.1-1.4 and Appendix A). The risks associated with the open corrective actions do not present imminent dangers. Where necessary, compensatory measures have been established. In a number of cases, the corrective action plans developed to eliminate or reduce the vulnerabilities have been completed. These activities are also outlined in this report.

Since the voluntary stand down of operations in September 1994, Y-12 operations have undergone numerous reviews by DOE Headquarters, DOE Oak Ridge Operations, Y-12 Site Office, and the Defense Board. If a finding has been identified as part of these reviews, it is entered into the Plant's corrective action tracking system and tracked to completion. Presently, all major mission areas with the exception of Enriched Uranium Operations (EUO) have

undergone readiness assessments and been authorized to restart. EUO is undergoing a series of process-based Operational Readiness Reviews (ORR) which are scheduled to be completed in 1998 (Phase A) and 1999 (Phase B). EUO is presently allowed to conduct limited “special” operations. Actions taken for the readiness assessments and ORR have enhanced the discipline and rigor of the ESH programs at the Y-12 Plant. Plans have been established for those programs needing improvement.

This report presents a summary of Y-12 known vulnerabilities as identified in the designated DOE-led vulnerability studies and Defense Board reviews. A preliminary review of facility conditions was conducted earlier this summer in response to the Red Alert issued on May 28, 1997, for the Hanford explosion. This review did not identify any new vulnerabilities. Facility “walkdowns” intended to validate the earlier review are currently under way or have been completed. The facility managers have been asked to examine their use or storage of any chemicals that have the potential for explosion, fire, or significant toxic release. Particular emphasis is being placed on legacy chemicals and materials located in inactive facilities. Detailed instructions were developed for the conduct of these “walkdowns,” including how Y-12 Facility Managers can identify time-dependent chemical hazards in the workplace as well as how to document the results. To date, no new vulnerabilities have been identified. The final results of these “walkdowns” will be included in the final response report to be submitted to DOE later this year.

Corrective actions are under way to eliminate or reduce the known vulnerabilities at the Y-12 Plant. Existing systems and processes are in place to prevent or resolve any future vulnerabilities that may arise. Funding will influence the ability and pace of the Y-12 Plant to eliminate all vulnerabilities; however, Y-12 is committed to the principles of integrated safety management of providing a safe workplace and performing work safely.

1. STATUS OF DOE VULNERABILITY REPORTS AND RECOMMENDATIONS

1.1 VALIDATION OF CONCLUSIONS FROM TOMSK SELF-ASSESSMENT

1.1.1 Background

On April 6, 1993, a sequence of events occurred at the Siberian Chemical Combine at TOMSK-7 in Russia that caused substantial physical damage to the facility. A runaway exothermic chemical reaction occurred in a large process vessel that contained a concentrated solution of uranyl nitrate, nitric acid, plutonium nitrate, residual fission products totaling approximately 560 Ci, and an undetermined amount of organic constituents derived from the solvent extraction process. This reaction produced a copious amount of flammable organic and inorganic gases and steam, which pressurized and burst the vessel; dislodged the concrete cell cover; and, it is believed, ignited in the area immediately above the cell.

In response to early reports of the incident, the Department of Energy (DOE) sent a team of experts to TOMSK-7 to learn the details of the incident and subsequently initiated a series of reviews at DOE sites to ensure that similar conditions do not exist in DOE processing vessels. In a February 23, 1994, letter to DOE Site Office managers, the DOE Oak Ridge Operations (ORO) Director of Safety and Health directed that a series of self-assessments be conducted based upon lessons learned from the TOMSK-7 incident.

The evaluation of safety concerns related to potential nitrate-organic chemical hazards at DOE facilities focused on nitrate-organic hazard vulnerabilities of all nitrate-organic materials, not just the nitric acid, heavy metal nitrates and extraction solvents. Included were waste storage tanks, ion-exchange resins, and other possible combinations of nitrate-containing solutions and organic compounds. The minimum quantity of material subject to the reviews was 25 liters to limit the scope of the review to chemical systems that could lead to either off-site or significant on-site consequences.

1.1.2 Conclusion

The DOE led task team identified no significant vulnerability at the Y-12 Plant in this area. The task team concluded that at Y-12 it is highly unlikely that a nitrate-organic reaction could occur. No systematic design defects or significant processing equipment deficiencies were noted. Waste storage tank issues were recognized as being well characterized with plans in place to monitor or remediate the flammability and reaction hazards present. No recommendations on the disposition of waste storage tanks or their contents were made. Ion-exchange resins that were exposed to nitrate media were being handled properly. Factors minimizing this probability include the absence of intense radiation fields as a factor in the production of degraded organics, room temperatures (other than in evaporators), visual observation of organic-aqueous phase separators, the venting of the systems to atmosphere, and other design and operation parameters

and procedures which are aimed at the elimination of the conditions of materials, temperatures, and pressures which contribute to “red oil” explosions.

The venting and the ambient temperatures of the solution storage systems at Y-12 reduce the risk of these small accumulations; however, the potential still exists for the accumulation of small amounts of degradation products resulting from extended periods of inoperation during which the acid aqueous and organic phase of system inventories are in contact with each other. Y-12 Operations continues to pay close attention to off-normal situations (such as the present stand down condition) to maintain the low probability of exothermic reactions. Shift management personnel facility rounds include inspection of the extraction systems for brown fumes, bubbles, and color or liquid level changes. No further actions in this area are deemed necessary.

1.2 VALIDATION/STATUS OF OPEN VULNERABILITIES FROM THE CHEMICAL VULNERABILITY ASSESSMENT

1.2.1 Background

On February 14, 1994, Secretary of Energy Hazel R. O’Leary directed the Office of Environment, Safety, and Health to lead a broad-based review to identify chemical safety vulnerabilities confronting DOE. These vulnerabilities represent circumstances of conditions that could result in fires or explosions from uncontrolled chemical reactions, exposure of workers or the public to hazardous chemicals, or release of hazardous chemicals to the environment.

Identified vulnerabilities and supporting observations were described in the *Chemical Safety Vulnerability Working Group Report* (DOE/EH-0398P). DOE/EH-0398P specified that applicable sites would prepare Comprehensive Response Plans to report their vulnerabilities and would address vulnerabilities requiring mitigation to comply with regulations, standards, and DOE directives. *The Comprehensive Site Response Plans to the Chemical Safety Working Group (Comprehensive Response Plans)* was issued October 25, 1995, under cover letter from Robert W. Poe, Assistant Manager for Environment, Safety, and Quality, to Joseph E. Fitzgerald Jr., Deputy Assistant Secretary for Worker Health and Safety, EH-5.

1.2.2 Generic Vulnerabilities for Chemical Safety

The DOE field verification portion of the Chemical Safety Vulnerability Review identified 35 facility- and site-specific vulnerabilities across the complex. Five facility-specific vulnerabilities were identified at the Y-12 Plant. The vulnerability and present status of that vulnerability are outlined in Section 1.2.3.

The DOE task team grouped the 35 complex vulnerabilities into eight generic vulnerabilities that had the potential to impact the DOE complex. Limited actions were identified in the *Comprehensive Response Plan* for the Y-12 Plant. The following sections describe the generic complex vulnerabilities, any actions required by the Y-12 Plant, and a summary of the plans and

programs utilized to prevent the development of the vulnerability at the Y-12 Plant. The year-end progress report will include information on any new chemical vulnerabilities that were identified during the facility walkdowns.

1.2.2.1 Unanalyzed Hazards

Generic Complex Vulnerability: “Many facilities and activities have not been thoroughly analyzed for the presence and magnitude of hazards associated with the use of chemicals. Failure to recognize and analyze such hazards increases the risk of personnel exposures and environmental releases due to accidents such as fires or explosions.”

Actions Required in Comprehensive Response Plan: No specific action identified for the Y-12 Plant.

Program Summary: In addition to the application of the actions taken as a result of Secretary Peña’s initiatives in response to the May 14, 1997, explosion at the Hanford Plutonium Reclamation Facility, four programs are primarily directed to the thorough analysis of the presence and magnitude of hazards associated with the use of chemicals: application of the Process Safety Management (PSM) requirements (29 CFR 1910.119) and the Risk Management Program (RMP) (40 CFR 68) when applicable, the Safety Analysis Program (implementation of DOE Order 5480.21, 5480.22, and 5480.23), and the TOMSK Lessons-Learned Program.

At Y-12, quantities and concentrations of hydrogen chloride have been identified as being covered by RMP. Management fully intends to comply with rule requirements within the designated time limits specified in the rule. In the future, hydrogen fluoride is expected to be utilized in quantities sufficiently large to be covered by both the PSM and RMP rules. Requirements of both rules will be met prior to the introduction of the hazardous chemical.

1.2.2.2 Past Chemical Spills

Generic Complex Vulnerability: “Many facilities have experienced spills and releases of hazardous chemicals to the soil. Known incidents have been identified and characterized in some cases. Additional spill or discharge areas may be discovered. Both known and unknown contaminated soil could pose hazards to workers as construction, environmental restoration, and decontamination and decommissioning activities increase.”

Actions Required in Comprehensive Response Plan: No specific action identified for the Y-12 Plant.

Program Summary: Several programs at the Y-12 Plant contribute to the adequate control of past chemical spills. These include the National Pollution Discharge Elimination System (NPDES) Program, the Occurrence Reporting and Processing System (ORPS), the Resource Conservation

and Recovery Act (RCRA) Program, the Groundwater Monitoring Program, and the Environmental Restoration Program (ERP).

The purpose of ERP is to cost effectively and safely eliminate or reduce to prescribed levels the risks posed to human safety and the environment by radioactive and/or hazardous contaminants at inactive sites and Decontamination and Decommissioning (D&D) facilities managed by ORO. This program implements the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process as prescribed in the Federal Facilities Agreement for the Y-12 facility. All facilities are required to undergo an investigation to determine the extent of contamination as a first step toward cleanup. Next, the cleanup options are identified and evaluated. An approach is selected, designed and implemented based on the identified hazards. The facilities are prioritized and addressed as resources are available. Currently D&D activities are included in ERP. A major portion of this program is surveillance and maintenance (S&M) aimed at maintaining the facilities in a safe manner until decontamination and decommissioning is possible.

1.2.2.3 Characterization of Chemicals

Generic Complex Vulnerability: “Many hazardous materials found at DOE facilities have not been adequately characterized to determine the types or quantities of the chemicals they contain or the potential risks they represent. This situation increases the likelihood of worker exposure to these materials resulting from lack of knowledge about where they are located, the specific hazards they pose, and the actions necessary to prevent or mitigate such hazards. The presence of these materials increases the risk of worker exposures during the conduct of routine and nonroutine operations (e.g., during decontamination and decommissioning activities at facilities containing residues, during emergency response efforts in areas containing uncharacterized hazards, or because of the increased potential for accidents resulting from the storage of incompatible chemicals).”

Actions Required in Comprehensive Response Plan: No specific action identified for the Y-12 Plant.

Program Summary: The Y-12 Plant continues to apply programs which lead to the identification and characterization of hazardous chemicals. The Safety Analysis Program plays a primary role in this endeavor. Additionally, all waste accepted for treatment, storage, and disposal must be characterized in accordance with applicable procedures. Facility “walkdowns” are currently under way. Facility managers have been asked to (1) verify their chemical inventories are up-to-date, (2) examine their storage of any chemicals that have the potential for explosion, fire, or significant toxic release and (3) identify any excess or residual chemicals. To date, no new vulnerabilities have been identified.

1.2.2.4 Planning for Disposition of Chemicals

Generic Complex Vulnerability: “DOE has significant quantities of hazardous and specialty chemicals that are no longer required to support ongoing activities. DOE facilities also have a wide range of smaller quantities of laboratory chemicals. At many sites, there is little incentive to reduce the inventory of chemicals that are no longer needed. The lack of systematic inventory planning and control increases DOE’s overall vulnerability to worker exposures and environmental releases. Furthermore, chemicals held in the absence of continuing need may be viewed as waste by Federal and State regulatory agencies and could be subject to the requirements of RCRA.”

Actions Required in Comprehensive Response Plan: Elimination of the excess inventory of nitrogen tetroxide (N_2O_4) and hydrogen fluoride. Continued safe storage and monitoring of mercury and lithium inventory owned respectively by the Defense Logistics Agency and Defense Programs.

Status: The excess inventory of N_2O_4 , approximately 1700 pounds, and hydrogen fluoride, approximately 11,000 pounds, has been sold since the DOE Chemical Safety Vulnerability Assessment was conducted resulting in a corresponding reduction in risk to the worker and environment. The reduction of the hydrogen fluoride inventory represents one of the most significant ESH accomplishments for the Y-12 Plant, reducing the potential for an industrial accident resulting in significant multi-person injuries or fatalities.

Program Summary: There remain four primary programs at the Y-12 Plant that contribute to the safe disposal of excess or unneeded chemicals: The Waste Site Identification and Characterization Program, the Safety Analysis Program, the Swap Shop, and the Hazardous Materials Information System (HMIS) Excess Materials List. The Waste Site Identification Program provides guidance for the initial identification and characterization of previously unidentified waste sites in order to determine the responsible organization and the required actions to be accomplished in accordance with regulatory and Energy Systems guidelines. In all phases of the Safety Analysis Program, a strong emphasis is placed on Risk Reduction Action Plans. The Swap Shop, a computer-based bulletin board, provides a means for identifying and advertising surplus materials, including chemicals, which may be of use to other plant organizations.

1.2.2.5 Chemical Storage Practices

Generic Complex Vulnerability: “Improper chemical storage practices are in use at many DOE facilities. Appropriate chemical storage practices should consider such factors as the adequacy and integrity of chemical containment (e.g., tanks, drums, secondary containment), segregation of incompatible chemicals, ventilation, temperature and humidity controls, fire protection, and protection from weather. A reluctance to dispose of inventories of hazardous materials that are no longer needed has exacerbated problems associated with the storage of chemicals. Further,

chemicals are often stored in aging facilities that are neither properly designed nor equipped for chemical storage.”

Actions Required in Comprehensive Response Plan: No specific actions were identified for the Y-12 Plant. Commitment was made by LMES to continue implementation of the Safety Analysis Report Update Program (subsequently replaced by implementation plan for DOE Orders 5480.22 and 5480.23).

Status: Basis of Interim Operations have been completed for most nuclear and moderate hazard facilities at the Y-12 Plant. A schedule has been submitted to DOE for improvements to the Y-12 authorization basis documents.

Program Summary: Several practices at Y-12 continue to support the safe storage of chemicals: the Hazardous Material Storage and Inspection procedures, management of hazardous waste in satellite accumulation points and 90-day accumulation areas, chemical storage practices within Waste Management facilities, application of controls identified through the Safety Analysis Program, and implementation of fire protection policies. Energy Systems Hazardous Material Storage and Inspection procedures provide management guidelines for storage and inspection of toxic and hazardous materials as part of the comprehensive Hazardous Materials Management Program. The Y-12 Plant implements procedures to provide for the proper management of hazardous wastes from point of generation until such time as they are treated and/or disposed of in approved, permitted facilities. In Waste Management facilities, hazardous wastes or hazardous portions of a mixed waste are managed in accordance with federal, state, and local statutes and regulations. As part of the Safety Analysis Program, where disposal of hazardous chemicals is not appropriate, other methods such as improved containment or segmentation are identified to improve safety to the extent practical.

1.2.2.6 Condition of Facilities and Safety Systems

“The structural deterioration of many DOE facilities in which chemicals are stored, handled, or processed increases the potential for worker exposures and environmental releases involving hazardous chemicals. In many instances, safety and essential support systems (e.g., utilities and ventilation systems) have not been effectively maintained, thus decreasing the margin of protection provided to workers, the public, and the environment against chemical hazards. Deficiencies due to inadequate maintenance budgets and the change in DOE mission have resulted in an increased number of ‘surplus’ facilities (i.e., facilities declared by DOE program offices to be available for other uses).”

Actions Required in Comprehensive Response Plan: No specific actions were required by the Y-12 Plant.

Note: The Highly Enriched Uranium (HEU) Vulnerability Study was also concerned with this area. See Section 1.3 for issues/vulnerabilities identified in that study.

Program Summary: The Safety Analysis Program at the Y-12 Plant categorizes facilities in accordance to a DOE-approved categorization process. Safety analysis documents for the identified hazardous facilities designated those structures, systems, and components required for safety. Y-12 also maintains an effective Industrial Safety Program that utilizes safety work permits to provide for the evaluation and control of potential or actual hazards associated with the performance of specified work whenever the presence of special or unusual hazards endanger the safety of personnel. The Industrial Hygiene Program also functions to identify, evaluate, and control environmental factors and stresses found in the workplace. Y-12 maintains an integrated management process that ensures that the physical and functional arrangement of selected configuration items meet requirements throughout facility life cycles. The Facility Transition Program is responsible for identifying surplus facilities, materials and equipment. Once identified, the program is also responsible for identifying and prioritizing ESH risks associated with those facilities/capability units and mitigating any remaining high risks including any associated with structural deterioration.

1.2.2.7 Abandoned and Residual Chemicals

Generic Complex Vulnerability: “As facility missions changed or were terminated, chemical inventories were often left in place; tanks, pipes, and other equipment were not flushed to eliminate chemical residues. These conditions have created vulnerabilities that are exemplified by workers inadvertently coming into contact with hazardous chemicals or chemical residues, particularly during decontamination and decommissioning operations; by increased public access to areas and facilities containing chemical hazards; and by environmental releases of hazardous chemicals due to degradation of abandoned facilities or equipment.”

Actions Required in Comprehensive Response Plan: No specific actions were required by the Y-12 Plant.

Program Summary: The Y-12 Plant continues the implementation of programs, initiatives, and procedures to ensure that abandoned and residual chemicals are properly identified, controlled, and/or removed. Such programs include the Environmental Restoration Program, Project Planning and Construction Procedures, RCRA, and Emergency Preparedness Planning. Additionally, a renewed campaign (discussed earlier) has been initiated as a result of a campaign to respond to Secretary Peña’s initiative resulting from the Hanford explosion. The Facility Transition Program is responsible for managing the safe and compliant deactivation of surplus facilities/capability units including the mitigation of high ESH risks. Facility/capability unit assessments are utilized to identify possible ESH risks which may include abandoned or residual chemicals.

1.2.2.8 Inventory Control and Tracking

Generic Complex Vulnerability: “Although most DOE sites have systems in place to record and monitor on-site chemical inventories, some systems do not provide up-to-date information on chemical quantities and locations. The absence of comprehensive inventory control systems creates the potential for exposure of workers to hazardous chemicals that are not known to be present; fires and explosions due to mixing co-located, incompatible chemicals; and diminished effectiveness of emergency response plans due to unidentified chemical hazards.”

Actions Required in Comprehensive Response Plan: No specific actions were required by the Y-12 Plant. A commitment was made by LMES to implement HMIS.

Status: Once the information developed in the facility walkdowns is entered into HMIS, the system will be fully implemented across the Y-12 Plant. The data entry is projected to be completed in the first quarter of CY1998. A recent audit, conducted in October 1997, found that, where implemented, the inventories and records are accurate.

Program Summary: There are two primary programs at Y-12 that ensure effective control and tracking of chemical inventories: HMIS and the Waste Tracking System. HMIS is a sitewide electronic data base for the tracking and control of hazardous chemical inventories. It supports the health and safety needs of multiple Y-12 ESH programs. The Waste Tracking System is a comprehensive facility-wide system that tracks waste from generation to disposal.

1.2.3 Site-Specific Vulnerabilities

During the field verification phase of the review, selected sites were identified to verify the accuracy and completeness of information provided by field self-evaluations. The Oak Ridge Reservation, including the Y-12 Plant, was included in the field verification effort. Five vulnerabilities identified below resulted from this review at Oak Ridge. Summaries of current conditions and programs which address the Y-12 vulnerabilities are provided.

1.2.3.1 CSVR-OR-ORR-01: Uncharacterized areas containing potentially hazardous materials are increasingly accessible

Oak Ridge-Specific Vulnerability: “Security areas at the Oak Ridge sites are shrinking as programs are cut back. The costs of maintaining such areas are high, and the Department’s increased openness promotes reduction in controlled areas, consistent with changing missions. Other access control measures, both administrative and physical, will diminish over time. At Oak Ridge, all facilities and operations have been subjected to at least a preliminary hazards screening. However, excess and abandoned facilities/sites that may not have been fully evaluated and characterized will become available for access by workers and the public. As this occurs, many individuals will not know the history of the facility/site, nor will they be aware of the real or potential hazards that may be present. The possible exposure of workers and the public to hazardous and/or toxic materials, environments, and situations without their knowledge or consent represents a high-priority vulnerability with a potential for short-term consequences.”

Status: This is not a vulnerability at the Y-12 Plant. Building 9201-4 remains the only facility undergoing remediation at the Y-12 Plant. It continues to be separated from the public by a guarded, alarmed fence as well as an administrative barrier requiring badge-reader access. Personnel entering the facility must have HAZWOPER/GET training or be escorted. Where hazardous materials have escaped into the surrounding soils, barriers have been erected to control access. Excavation is allowed only after careful work planning, including the identification of appropriate protective equipment and/or administrative controls. The Facility Transition Process will be utilized to ensure safe and compliant deactivation of additional facilities and capability units identified as surplus.

1.2.3.2 CSVR-OR-ORR-02: Chemicals are stored in facilities not designed for that purpose

Oak Ridge-Specific Vulnerability: “Buildings and equipment are being used for purposes for which they were not intended or beyond their expected life. Some cylinders used for storing uranium hexafluoride have failed in the recent past, releasing small quantities to the atmosphere. The process of aging will accelerate as cylinders reach the end of their functional life. The storage of 23.6 million pounds of lithium hydroxide — plus smaller quantities of low-level radioactive waste, other hazardous chemicals, and chemical residuals — in steel drums represents another potential hazard. Storage areas currently being used have no climate control; thus, the drums are subject to the long-term effects of corrosion due to diurnal and seasonal extremes of temperature and humidity. Projects for storage facilities have been proposed but have not been funded. These conditions and circumstances represent a medium-priority vulnerability with a potential for medium-term consequences.”

Status: This remains a potential vulnerability at the Y-12 Plant; however, based upon engineering judgment the risk is low. The Y-12 Plant continues to store large quantities of mercury in Building 9720-26. The mercury is contained in metal cylinders stored on a sealed, diked floor. Although the present storage arrangement is considered to be safe, a safety analysis for this facility is planned when funding becomes available.

1.2.3.3 CSVR-OR-ORR-03: Facilities were placed in caretaker status without appropriate cleanup or documentation

Oak Ridge-Specific Vulnerability: “When a facility changes from operational to caretaker status without thorough cleanup operations, chemicals left in the facility can represent a potentially hazardous condition and/or environmental concern. Such chemicals may be hazardous in their original state or as degradation products that result over time. Chemicals and/or their degradation products may also cause damage to equipment or structures or be affected by building or container deterioration due to natural aging. The loss of corporate memory (e.g., as a result of personnel transfers and retirements, facility aging, downsizing, multiple usage, and inadequate configuration management and record keeping in the past) may result in chemical hazards when new operations are attempted. The potential for fire, employee exposure,

inadvertent releases to the atmosphere, and higher cleanup costs represents a medium- to high-priority vulnerability with a potential for short- to long-term consequences.”

Status: Major/obvious vulnerabilities have been ameliorated. Characterization of Building 9201-4 was completed in 1994; however, future use and cleanup acceptance criteria remain unknown. The decision on how far decontamination and decommissioning will be performed remains unknown and is dependent on program funding and direction. There are no present plans to use the facility as a chemical storage facility. Recovered mercury was flaked and moved to Building 9720-26 for storage. As other facilities or capability units are identified as surplus, the Facility Transition Process will require the performance of a deactivation walkdown assessment to determine deactivation requirements. This assessment will be used to identify health and safety concerns as well as pollution prevention opportunities using facility walkdowns and interviews with persons knowledgeable about the facility and processes conducted within that facility. These assessments will be analyzed to determine the actions necessary to place the facility or capability units in a safe and compliant condition.

1.2.3.4 CSV-OR-ORR-04: Inconsistent formality and rigor are applied to the management of hazardous materials

Oak Ridge-Specific Vulnerability: “Use of the Hazardous Materials Information System for chemical inventories is an effective tool for enhancing safety and control, but it is not used in all facilities at Oak Ridge. Chemical inventories (e.g., lithium hydroxide, uranium hexafluoride) in long-duration storage are currently stable and pose normal industrial hazards, but the risk could increase during extended storage as containers and facilities deteriorate. Funds requested to upgrade storage conditions have not been obtained. Funds have been proposed to upgrade storage conditions, but in the absence of regulatory drivers, some projects have not had sufficient priority. Hazardous materials in some laboratories are excluded from the more rigorous controls specified for some other facilities. Casual handling and housekeeping practices in some laboratories are inconsistent with site procedures, DOE 5480.19, and 29 CFR 1910.1450. These conditions and circumstances represent a medium-priority vulnerability with a potential for short- to long-term consequences.”

Status: Full implementation of HMIS has not been completed. Once the information developed in the facility walkdowns is entered into HMIS, the system will be fully implemented across the Y-12 Plant. Data entry is projected to be completed in the first quarter of CY1998. A recent audit, conducted in October 1997, found that, where implemented, the inventories and records are accurate. More information on this issue will be included in the year-end progress report.

As part of the actions in response to Secretary Peña’s initiative, Y-12 managers were directed to “walk their spaces” to reassess facility hazards. Guidance was provided to assist in the evaluation of incompatibility of chemicals. Managers were also directed to expedite the annual revision to HMIS. The Y-12 Plant relies on HMIS for tracking the acquisition, storage, and use of hazardous chemicals.

The ongoing preparation for the ORR for EUO and readiness assessments for the remaining major mission areas have increased the rigor and formality of Y-12 operations. Prior to resumption, the procedures and associated training for each mission area were upgraded. In preparation for the ORR, EUO procedures and training are also being upgraded. In addition, a site Conduct of Operations manual was issued to ensure appropriate rigor and formality continues to be applied to Y-12 operations.

1.2.3.5 CSV-ORR-05: Large quantities of specialty and other industrial chemicals are stored without consistent strategic planning

Oak Ridge-Specific Vulnerability: “This potential vulnerability involves the storage of bulk quantities of unique chemicals that are now surplus to national defense programs. Chemicals stored at Y-12 and K-25 include lithium and its compounds, beryllium and its compounds, uranium hexafluoride, and mercury. Over time, unanticipated chemical hazards may result from the storage of these chemicals in temporary facilities. Chemical aging, which degrades the material to unknown byproducts, represents another potential hazard. The storage of this material also represents a long-term economic commitment by DOE. These conditions and circumstances represent a medium-priority vulnerability with a potential for medium- to long-term consequences.”

Summary: This remains a vulnerability; however, actions have been taken to reduce the risk. The excess inventory of hydrogen fluoride, approximately 11,000 pounds, and N_2O_4 , approximately 1700 pounds, has been sold. Beryllium and lithium compounds continue to be part of the chemical inventory. Defense Programs retains ownership of the material. Any decision regarding the disposition of the stockpile will be made by DOE. A Basis for Interim Operation document (YEMG/BIO-009) serves as the authorization basis for the facility. A follow-on Safety Analysis Report is presently under DOE review for approval.

Large quantities of mercury continue to be stored in Building 9720-26 for the Defense Logistics Agency as well as the DOE. The inventory will continue to be reintroduced into the commercial mercury market in a controlled manner, thus reducing the hazards from storage of the material at the Y-12 Plant.

1.3 VALIDATION/STATUS OF OPEN VULNERABILITIES FROM HIGHLY ENRICHED URANIUM VULNERABILITY ASSESSMENT

1.3.1 Background

In March 1994, Secretary of Energy Hazel R. O’Leary directed DOE to conduct an assessment of ES&H vulnerabilities associated with the storage of weapon-usable fissile materials across the DOE complex. The ES&H vulnerability assessment for HEU storage was initiated by the Secretary in February 1996 and was completed in August 1996.

HEU is defined as uranium at least 20 percent of which is the fissile isotope uranium 235 (U-235). The potential for ES&H vulnerabilities associated with HEU at the Y-12 Plant was assessed. This assessment, performed by a team of the site's technical experts, consisted of document research, personnel interviews, and facility walkdowns. The Self-Assessment Team (SAT) results were subsequently validated by a DOE-HQ Working Group Assessment Team. *The Highly Enriched Uranium Working Group Report*, DOE/EH-0525 (Vol. I: Summary and Vol. II: No. 1), was reviewed during this reassessment.

1.3.2 Findings

A total of 49 ES&H vulnerabilities were identified for the Y-12 Plant as part of the assessment: 20 associated with facility condition, 9 with material/packaging, and 20 institutional issues. Vulnerabilities identified included:

- The potential for fire in various buildings, resulting in the off-site releases of enriched uranium. Although considered to be a low probability, the condition is aggravated in some buildings by the presence of combustible materials, the absence in some areas of protective sprinklers and fire protectors, and/or the established pyrophoricity of finely divided uranium metal.
- Vulnerabilities relating to enriched uranium storage, including the construction and condition of storage facilities, the quality and condition of packaging, and recognition that due to the age of Y-12 facilities, none of the Y-12 Plant storage facilities meet the current DOE criteria for new storage facilities.
- Buildings involved in enriched uranium operation are all relatively old and built to standards that were not well documented. Some of the buildings and equipment have not been completely analyzed as to their ability to withstand natural phenomena events.
- Maintenance problems, such as inleakage of rain water and process liquid leaks, were widely present. There was a substantial backlog of building and equipment maintenance tasks.
- Many buildings with a long history of uranium processing have accumulated uranium contamination that is difficult to remove.
- Shortcomings in the conduct of operations, which were the underlying cause of the stand down, were still in evidence.
- Chemical reactions, especially those between HEU and water.
- The accumulation of a large number of stored items in some buildings, including radiologically contaminated waste.

- Accumulation of material in process and waste material, exacerbated by the long downtime.

1.3.2 Corrective Action Status

The 49 ES&H vulnerabilities resulted in the identification of 111 corrective actions. To date, 79 actions have been closed. Progress continues to close those remaining. Tables A.1-A.3 of Appendix A present the status of each vulnerability identified in the *HEU Vulnerability Report*.

1.3.3 Discussion of Vulnerabilities and Associated Risks

As detailed in the HEU Vulnerability Report and the Self-Assessment Team Reports, most of the identified vulnerabilities result in relatively low risk to workers, the environment, and the public. Most of the vulnerabilities have a low to very low probability of occurring. See *HEU Vulnerability Report* for further information on the methodology utilized to assign risks to the vulnerabilities. For those vulnerabilities identified as having a higher likelihood, most generated low consequences to the worker and below threshold consequences to the public and the environment. Only SAT-003/GEN, uranium contamination, and SAT-005/GEN, potential leaks and spills, were rated as having a high likelihood with medium consequences to the environment (SAT-003) or the worker (SAT-005). While the corrective action plans for these vulnerabilities are still open, significant progress has already been made. See Sections 1.3.3.1 and 1.3.3.2 below.

1.3.3.1 SAT-003/GEN

With the implementation of the Site Radiological Control Manual, the risk of environmental release has been greatly decreased through contamination surveys and remediation. In addition, a comprehensive Y-12 Plant Decontamination Plan has been developed and decontamination work has been completed on the docks identified in Y/DQ-74, *Y-12 Radiological Docks - Assessment and Decontamination Priority Plan*.

1.3.3.2 SAT-005/GEN

A number of actions have been taken to mitigate the consequences of a spill or leak including a surveillance program to review carbon steel cans for corrosion and to replace them with stainless steel cans. Facility modifications have been made during the last five years to those areas where a leak is most likely. Improvements have been made to building room air sampling systems used to monitor airborne radiological contamination in HEU processing areas.

1.4 VALIDATION/STATUS OF OPEN VULNERABILITIES FROM PLUTONIUM VULNERABILITY ASSESSMENT

1.4.1 Background

In March 1994, Department of Energy Secretary Hazel R. O'Leary commissioned a comprehensive assessment to identify and prioritize the environment, safety, and health vulnerabilities that arise from the storage of plutonium in the Department of Energy facilities and determine which are the most dangerous and urgent. The assessment was commissioned because of ruptures of stored plutonium packages and the need to store safely the large amount of plutonium-bearing materials held by the Department in its aging facilities. The results of this assessment were published in DOE/EH-0415, *Plutonium Working Group Report on Environmental, Safety and Health Vulnerabilities Associated with the Department's Plutonium Storage*, dated November 1994.

1.4.2 Status

For those areas operated by LMES, today, no vulnerability exists at the Y-12 Plant in regards to plutonium. The *Plutonium Vulnerability Study* identified three buildings at the Y-12 Plant site with potential plutonium vulnerabilities, Buildings 9212, 9213, and 9204-3. (Building 9204-3 is operated by Lockheed Martin Energy Research [LMER]. The LMER response to Secretary Peña's initiative should be consulted relative to this report and any associated vulnerabilities).

According to the *DOE Plutonium Vulnerability Report*, DOE does not give sites with lesser plutonium holdings the level of attention it gives to sites with large holdings since low inventory generally signifies low hazard. Nevertheless, releases of plutonium from such facilities can also present hazards to workers, the public, and the environment. Hazards at sites with low plutonium inventories may be reduced by consolidating unneeded plutonium materials at larger sites.

Since the time of the vulnerability study, material in the form of plutonium sources formerly stored in Building 9213 has been transferred to Building 9983, the Sealed Source Storage Facility. Building 9212 still maintains a few sealed sources containing PuBe (total of 1.040 kg) and a few AmLi sources needed for operational purposes. The sources in Buildings 9983 and 9212 do not pose any significant consequences due to routine material checking, their protected location, and encapsulation.

1.5 REASSESSMENT/STATUS OF DEFENSE BOARD RECOMMENDATIONS

Several Defense Board recommendations are applicable to the Y-12 Plant for this evaluation including:

- Defense Board Recommendation 93-3, *Improving DOE Technical Capability*,
- Defense Board Recommendation 93-6, *Maintaining Access to Nuclear Weapons Expertise in the Defense Nuclear Facilities Complex*,

- Defense Board Recommendation 94-4, *Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant*, and
- Defense Board Recommendation 95-2, *Safety Management*.

1.5.1 Safety Management

While the following recommendation does not identify a vulnerability; it has the potential to impact the identification and control of potential vulnerabilities. Therefore, it is included in this reassessment.

Defense Board Recommendation 95-2, *Safety Management*, was issued on October 11, 1996. DOE summarized the Board's desires as

“...1) an institutionalized process for ensuring environment, safety, and health requirements are met, 2) safety management plans for conduct of operations, tailored based upon risk, 3) a prioritized list of facilities/activities based on hazards and importance, 4) direction and guidance for the integrated safety management system, and 5) measures to ensure the Department has or will acquire the necessary technical expertise to effectively implement the process.”

Status: In response, Y-12 has submitted a description of the proposed Integrated Safety Management Plan (ISM) to the Y-12 DOE Site Office for their review. A draft procedure based on the Y-12 ISM has been developed. Enhancements are under way to existing programs to support full implementation of the plan. ISM will be more fully discussed in the year-end progress report.

1.5.2 Criticality Safety/Conduct of Operations

Recommendation 94-4 was issued due to the concerns raised at the time of the voluntary stand down at the Y-12 Plant. These concerns questioned the degree of implementation and rigor of the Criticality Safety and Conduct of Operations Programs. These issues were identified in the *HEU Vulnerability Study* as vulnerabilities.

Status: The DOE Implementation Plan developed to address Recommendation 94-4 established a series of task teams to review the Y-12 Criticality Safety and Conduct of Operations programs and make recommendations. These teams have completed their reviews and identified a series of deficiencies and improvements related to these programs. Corrective action plans were developed to address these findings and are being tracked. Quarterly status reports are provided to the Defense Board and available on the DNFSB DOE Liaison Page on the World Wide Web.

1.5.3 Technical Capability

As identified in the third initiative of Secretary Peña's August 4, 1997, letter and the *Chemical Vulnerability Study*, technical knowledge and competency are key aspects to understanding the past use and condition of a facility and evaluating the hazards presented by materials in that facility. Therefore, the following recommendations were considered as impacting chemical and radiological safety.

1.5.3.1 Defense Board Recommendation 93-6

The Defense Board issued Recommendation 93-6 on October 10, 1993, to "draw attention to the need to retain access to capability and capture certain critical defense nuclear activities, in order to avoid future safety problems in these and related activities."

Status: This recommendation is considered closed. A knowledge preservation program was initiated at the Y-12 Plant. Present and past employees were videotaped to capture their knowledge and understanding of past processes and operations. A program has been established to capture information from key personnel as they retire. Therefore, this is not considered to be a vulnerability.

1.5.3.2 Defense Board Recommendation 93-3

The June 1, 1993, Defense Board Recommendation 93-3 outlines concerns about the ability to recruit and retain adequately qualified personnel to ensure safe operation of defense nuclear facilities. As part of its implementation plans, DOE promised to put renewed emphasis on ensuring the implementation of DOE Order 5480.20A dealing with training and qualification of nuclear workers. This was also identified as a vulnerability in the *HEU Vulnerability Study*.

Status: The Y-12 Training and Qualification Program for nuclear workers is described in Y/GA-66/R6, *Y-12 Plant Training Implementation Matrix (TIM) for DOE Order 5480.20A*, including the schedule for reaching full compliance. It should be noted that personnel are permitted to work only on operations for which they have completed the appropriate qualification program; therefore, while the TIM has not been fully implemented, the risk of this vulnerability is considered to be significant. The Training and Qualification Program will be more fully discussed in the year-end progress report.

1.5.4 Defense Board Trip Reports

Since the stand down in 1994, Defense Board staff members have periodically reviewed Y-12 operations and issued trip reports on their conclusions. Recent trip report conclusions with chemical or radiological safety implications include:

- Limited progress in resolving deficiencies in the preventative maintenance (PM) program.

Status: An 80 percent decrease in overdue items has been experienced since dedicated personnel have been assigned to assist in the reduction of overdue PM items. PM frequencies to meet operational needs have been reevaluated. Scheduling, tracking, and record keeping have been improved.

- Lack of comprehensive job hazard analysis on maintenance jobs in EUO.

Status: Y-12 Plant Procedure Y10-012, *Requesting Maintenance Services*, is being revised to (1) ensure job hazard analysis is completed prior to job planning, (2) designate operations as the responsible party for leading the job hazard screening process, and (3) provide a revised screening checklist to assist in the analysis.

- Deficiencies in EUO authorization basis documents and controls developed based upon those documents.

Status: As part of the restart effort, a new BIO and Operational Safety Requirements Document have been developed for Building 9212. As each process is restarted, the responsible process engineer is tasked with reviewing the authorization basis documents and identifying where the requirements are captured in Energy Systems or Y-12 controls/command media including plant and operating procedures. Eventually, this information will be captured and maintained electronically in a linking data base.

- Combustible levels in Building 9212.

Status: Since the issuance of these trip reports, action have been taken to reduce the level of combustibles in Building 9212, particularly the E-Wing basement where compensatory measures have now been removed. Condition of the fire protection systems in Building 9212.

- Condition of the fire protection systems in Building 9212.

Status: The sprinkler system was reviewed by Fire Protection Engineering, Central Engineering Services, and the EUO process engineers. The review indicated no significant erosion of outer piping. Piping has been cleaned, primed, and painted.

1.6 PRICE-ANDERSON AMENDMENTS ACT (PAAA) POTENTIAL NONCOMPLIANCES

As of October 30, 1997, the Y-12 Plant has reported 24 potential PAAA noncompliances. Five potential noncompliances have been reported to the DOE Noncompliance Tracking System (NTS) as potentially significant. The remainder have been reported as potential minor noncompliances. These deficiencies are handled within the normal corrective action process.

Both significant and minor potential PAAA noncompliances are identified in the internal tracking system and corrective action plans are tracked to completion. Tables B.1 and B.2 of Appendix B summarizes the potential PAAA noncompliances with chemical or radiological safety implications.

1.7 STATUS OF SEISMIC EVALUATIONS AT THE Y-12 PLANT

There are two DOE directives which trigger evaluations to determine the seismic safety of buildings at the Y-12 Plant. One directive is the EO 12941, *Seismic Safety of Federally Owned or Leased Buildings*, and the other directive is DOE Order 420.1, *Facility Safety*.

Executive Order (EO) 12941 requires federal agencies to develop an inventory of their buildings; evaluate the seismic safety of the buildings, and prepare cost estimates for mitigating unacceptable risks for buildings in that inventory. DOE Headquarters issued the *DOE Management Plan to Implement EO 12941* as the guidance for DOE sites to follow. The DOE management plan defines four phases for the implementation of EO 12941. These phases are the (1) inventory, (2) evaluation, (3) cost estimation, and (4) report.

The implementation of the requirements in EO 12941 was initiated in October 1997 and will be completed in January 1998. The inventory phase will define the buildings which are exempt from the EO 12941 and the nonexempted buildings. The model building types of the nonexempted buildings will be determined and evaluations will be performed of a sample of buildings from each model building type identified at the Y-12 Plant. Past seismic evaluations at Y-12 and evaluations of similar buildings at other sites will be used as part of the evaluation.

The EO 12941 seismic evaluations are primarily focused on (1) the life safety of the occupants in case of a collapse of the building and (2) determining cost estimates. The number of all federally owned or leased buildings which are determined to be seismically deficient and the cost estimates for mitigating the seismic risk of the buildings will be used to establish future national public policy.

The DOE Order 420.1 directive is primarily focused on the potential release of hazardous materials which could effect the general public off site and the workers on site. More rigorous seismic evaluations are required to evaluate the buildings plus the equipment and components inside the buildings which are involved with processing or storage of hazardous materials. Safety Analysis Reports (SARs) are prepared which require the seismic evaluations. Many existing SARs at the Y-12 Plant are in the process of being updated. The SARs will address the vulnerability of chemical storage at the Y-12 facilities and consider the seismic vulnerability of the facilities. The evaluations performed as part implementing the EO 12941 will be utilized, as appropriate, to support the SARs.

1.8 ISSUES MANAGEMENT

To ensure issues were being effectively recognized and resolved, a Y-12 Issues Manager was appointed in 1996. Information that is factored into the issues management process include DOE Monthly Assessments and Y-12 self-assessments. Corrective action plans are developed and tracked for identified deficiencies. The Issues Manager produces an Issues Management Report annually to describe major programmatic issues at the Y-12 Plant that have been identified over the past year. This report was reviewed to identify any specific issues that could impact chemical/radiological safety. Specific issues identified in the Issues Management Report¹ include:

- Not all facilities have completed facility hazard assessments, facility emergency planning, or management self-assessments as required.
- Y-12 Plant personnel continue to work with increasing attention to dikes around storage tanks and transfer stations to bring them up to modern standards.
- Document control needs to be improved.
- Programmatic weaknesses in the fire protection program need to be resolved.
- Adverse trend has been identified in work controls.

Tables C.1 and C.2 of Appendix C provides an overview of issues that have been identified. Issues management plans are approved by DOE. Any changes to the plans must receive DOE approval.

1.9 RED ALERT - CHEMICAL EXPLOSION AT HANFORD

In response to the chemical explosion at Hanford, LMES released Red Alert Number R-1997-OR-LMESCENT-0501 on May 28, 1997. This alert requested each LMES organization to review their vulnerability assessments, issues identified in the alert and other assessments/surveillances to ensure that the organization understood the hazards of its chemical inventory and was taking appropriate actions in response. To date, no new deficiencies have been identified.

¹ This list and the associated table excludes issues previously identified in earlier vulnerability summaries including Conduct of Operations, Preventative Maintenance, Criticality Safety and Safety Analysis Programs.

2. CONCLUSION

Corrective actions are identified and under way to eliminate or reduce the known vulnerabilities at the Y-12 Plant. Existing systems and processes are in place to detect existing vulnerabilities or prevent or resolve any future vulnerabilities that may arise. Funding will influence the ability and pace of the Y-12 Plant to eliminate all vulnerabilities; however, Y-12 is committed to the principles of integrated safety management of providing a safe workplace and performing work safely as evidenced by the actions and programs that address the vulnerabilities outlined in this report including the elimination of the excess inventory of hydrogen fluoride and N_2O_4 . The reduction of the hydrogen fluoride inventory represents one of the most significant ESH accomplishments for the Y-12 Plant, reducing the potential for an industrial accident resulting in significant multi-person injuries or fatalities.

Appendix A
Detailed Status Report on HEU Vulnerabilities

Table A.1 – Canceled/Closed HEU Vulnerabilities Action Plans

VAF Number	Facility	VAF Description	Internal Issue Number	Status	Closure Date
WGAT-002	Institutional	Changes to facility operations not always reflected in safety authorization bases	133477	Canceled	05/13/1997 (date of cancellation)
SAT-003	9206	Characterization lacking for contamination in abandoned, underground ventilation system.	133439	Closed	08/05/1997
WGAT-004	9212/9206	Inadequate storage practices for bottles of HEU liquids leading to inadvertent transfers, inadvertent chemical reactions, firefighting difficulties or hydrogen explosions	133452	Externally Closed	08/14/1997
SAT-001	9720-5	Fire in wooden frame building resulting in spread of HEU contamination	133444	Closed	10/03/1997
SAT-002	9720-5	Unverified inner container condition, presenting increased risk to workers	133445	Closed	10/09/1997
SAT-001	9995	Fire caused by pyrophoric metals, flammable solvents, and gases in Analytical Laboratory	133448	Closed	09/17/1997
SAT-002	9995	Unintentional chemical reactions caused by incompatible chemicals in Analytical Laboratory	133449	Externally Closed	06/30/1997
SAT-001	Institutional	Lack of readily available information on HEU storage containers/material	133465	Closed	10/09/1997
SAT-004	Institutional	Need for new radiological controls to ensure that worker exposures are minimized as HEU storage increases	133469	Closed	08/19/1997
SAT-007	Institutional	Incomplete implementation of Y-12 Plant storage standards for some HEU materials	133472	Externally Closed	08/12/1997
WGAT-006	Institutional	Insufficient maturity of Radiological Controls Program and lack of integration with operations, resulting in unnecessary worker exposures	133480	Closed	08/19/1997
WGAT-007	Institutional	Personnel turnover and lack of training in the Emergency Response Organization, adversely affecting accident mitigation and response	133481	Closed	04/17/1997
WGAT-008	Institutional	Deterioration of process equipment and lack of routine wipedown and decontamination, resulting in increased worker exposure	133482	Externally Closed	08/11/1997
SAT-001	Multiple Facilities	Improper storage of HEU metal chips in water-based coolant, possible resulting in fire or explosion	133456	Externally Closed	06/30/1997
SAT-006	Multiple Facilities	Release of HEU from unfiltered building ventilation or failure of Building 9212 wet vacuum system	133463	Closed	07/07/1997
SAT-009	Multiple Facilities	Nuclear criticality program conduct of operation weaknesses	133466	Externally Closed	06/30/1997
SAT-010	Multiple Facilities	Inability to hear criticality accident alarm system in normally unoccupied areas	133468	Externally Closed	06/30/1997
WGAT-003	Multiple Facilities	Degradation of packaging and labeling, leading to contamination and worker exposure	133451	Closed	07/18/1997
WGAT-005	Multiple Facilities	Storage of HEU solid and liquid materials in unsealed containers and lack of HEPA filters, leading to worker exposure	133459	Externally Closed	08/14/1997
WGAT-006	Multiple Facilities	Increased fire potential from accumulation of temporarily stored, low-level radioactive combustibles	133460	Closed	08/14/1997

Table A.2 - On-Hold HEU Vulnerabilities Action Plans

VAF Number	Facility	VAF Description	Issue Number	Status	Closure Date
SAT-002	Institutional	Training and qualification of Y-12 employees, noncompliant with DOE requirements	I33467	On-hold See roll up issue I31735	01/31/1999 (I31735)
SAT-006	Institutional	Decreasing experience levels for operating personnel	I33471	On-hold See roll up issue I31735	01/31/1999 (I31735)

Table A.3 – Open HEU Vulnerabilities Action Plans

VAF Number	Facility	VAF Description	Internal Issue Number	Major Activity Remaining	Closure Date
SAT-001	9204-2/2E	Fire caused by pyrophoric metal chips or loss of inert glovebox atmosphere	133435	Submit SAR for facility.	01/31/1999
SAT-002	9204-4	Fire caused by pyrophoric material chips	133436	Submit SAR for facility.	01/31/2000
SAT-001	9206	Incomplete fire protection by sprinklers for Buildings 9206 and 9720-17	133437	Submit Basis of Operation (BIO) for facility.	06/29/1998
SAT-002	9206	Unintended chemical reactions/explosions, with spread of HEU	133438	Submit BIO for facility.	06/29/1998
WGA1-002	9212	Releases due to failure of structural steel members and collapse of exterior wall during seismic and wind events	133450	Submit SAR for facility. Complete physical upgrades to E-Wing.	10/30/2003
WGA1-001	9212/9206/ 9720-17	Extensive earthquake-caused HEU spills and exposures in Buildings 9212, 9206, and 9720-17	133454	Submit SAR for facility.	01/31/2000
SAT-001	9215	Fire caused by metal chips, with HEU releases	133443	Submit SAR for facility.	01/31/2000
SAT-001	9720-12	Fires caused or spread combustible materials stored in drums in Buildings 9720-12 and 9201-5	133447	Submit BIO and SAR for 9720-12. Remove HEU from storage area in 9201-5 and consolidate in other areas.	10/30/1998
WGA1-003	9720-12	Potential wind and earthquake damage to sheet metal storage facility	133455	Submit BIO and SAR for facility.	10/30/1998
SAT-001	CR9212	Fire in chemical recovery area with limited coverage by fire sprinkler systems	133440	Submit SAR for facility.	01/31/2000
SAT-002	CR9212	Unintended chemical reactions/explosions, with spread of HEU	133441	Submit SAR for facility.	01/31/2000
SAT-003	EW9212	Potential fire in E-Wing filter house or metal chip fire, with HEU release	133442	Submit SAR for facility. Replace filter bags in E-Wing baghouse with bags of fire retardant material.	01/31/2000
SAT-005	Institutional	Incomplete natural phenomena evaluation of Y-12 facilities	133470	Submit BIO and SAR for 9720-12 and 9206. Submit SAR for remaining facilities.	01/31/2000
SAT-008	Institutional	Lack of storage standards for canned subassemblies and in-process material	133473	Develop storage standards for CSAs and in-process materials. Note: In-process material standard development has been placed on-hold.	10/30/2001
SAT-009	Institutional	Incomplete implementation of Defense Board 94-4 recommendations (Conduct of Operations program weaknesses)	133474	Implement requests for approval for Conduct of Operations in EUO, support and balance of plant organizations.	01/18/1998
SAT-010	Institutional	Facility and equipment maintenance hampered by large preventative maintenance backlog	133475	Complete preventative maintenance program improvements.	01/31/1999
WGA1-001	Institutional	Failure of existing safety basis documents to identify all key barriers to accidents	133476	Submit BIO and SAR for 9720-12 and 9206. Submit SAR for remaining facilities.	01/31/2000
WGA1-003	Institutional	Major Y-12 HEU storage areas noncompliant with DOE design criteria for fire, natural phenomena events and other events	133478	Submit BIO and SAR for 9720-12 and 9206. Submit SAR for remaining facilities.	01/31/2000
WGA1-005	Institutional	Extended HEU storage due to lack of plan for stabilization of in-process HEU materials, jeopardizing workers, the public and the environment	133479	Complete EUO restart and begin processing backlog.	05/30/1999
SAT-002	Multiple Facilities	Intrusion of water into Y-12 processing or storage areas	133457	Perform engineering assessments relating to deteriorating roofs as well as storm water run-offs. Note: actions have been placed on-hold pending funding.	10/30/1998
SAT-003	Multiple Facilities	Uranium contamination from past practices, presenting a low-level risk to workers and medium risk to the environment	133458	Complete accelerated decontamination work.	No date assigned to issue, last action due 09/30/1999
SAT-005	Multiple Facilities	Potential leaks and spills from handling of process equipment and storage containers, which represent sources for HEU contamination of workers	133461	Install additional continuous air monitors. Remove product cooler of the primary intermediate evaporator from process utilities.	05/01/1999
SAT-007	Multiple Facilities	Large backlog of HEU material awaiting processing and in-process materials containing HEU increasing the potential for HEU leaks/spills and releases during accidents.	133464	Complete EUO restart and begin processing backlog.	05/30/1999
SAT-011	Multiple Facilities	Fire potential from leaks in methanol-water cooling system	133487	Reduce methanol content to nonflammable concentrations.	11/27/1997

VAF Number	Facility	VAF Description	Internal Issue Number	Major Activity Remaining	Closure Date
WGA1-001	Multiple Facilities	Lack of independent verification in the Y-12 lockout/tagout program, leading to worker contamination or injury	133446	Implement requests for approval for conduct of operations.	01/18/1998
WGA1-004	Multiple Facilities	Storage of HEU containers on open racks, without restraints, leading to accidents and spills	133453	Submit SAR for facilities.	01/31/2000
WGA1-007	Multiple Facilities	Inadequate lighting, increasing the potential worker accidents and injuries	133462	Reevaluate areas to verify that adequate lighting has been maintained.	11/30/1997

Appendix B
Detailed Status Report on Potential PAAA Noncompliances

Table B.1 - Closed Potential PAAA Noncompliance Action Plans

NTS Number (ORPS Number)	Description	Internal Issues	Closure Date	Significance Level
		Number		
NTS-ORO-LMES-Y12NUCLEAR-1996-0001 (ORO-LMES-Y12NUCLEAR-1996-0010)	Operational Safety Requirements (OSR) violation. Fire patrol not completed within time limits.	130736	02/15/1997	Significant
NTS-ORO-LMES-Y12NUCLEAR-1996-0002 (ORO-LMES-Y12NUCLEAR-1996-0016)	OSR violation. Personnel violated Criticality Accident Alarm System (CAAS) compensatory measures.	131254	11/07/1996	Significant
		133378	07/23/1997	Significant
NTS-ORO-LMES-Y12NUCLEAR-1997-0001 (ORO-LMES-Y12NUCLEAR-1997-0006)	OSR violation. Personnel violated CAAS compensatory measures.			
N/A	Deficiencies in Issues Management Program	130411	06/10/1997	Minor
N/A	Management assessment deficiencies	130412	08/20/1997	Minor
N/A	Unreviewed Safety Question Determination deficiencies	130654	10/24/1996	Minor
(ORO-LMES-Y12NUCLEAR-1996-0003)	Inadvertent access to radiation area. Area not correctly posted.	130751	12/12/1996	Minor
(ORO-LMES-Y12NUCLEAR-1996-0013; ORO-LMES-Y12NUCLEAR-1996-0015)	Discovered combustibles in nonapproved areas. Potential intake of radioactive materials by five employees	131261	03/20/1997	Minor
		132230	10/16/1997	Minor
(ORO-LMES-Y12NUCLEAR-1996-0014)	OSR violation during conduct of quarterly CAAS surveillances. Entered 15 foot boundary.	132253	05/08/1997	Minor
(ORO-LMES-Y12NUCLEAR-1996-0022)	Potential concern/issues during conduct of work on master box. Limiting Condition of Operation (LCO)	132257	05/06/1997	Minor
(ORO-LMES-Y12NUCLEAR-1996-0021)	Attempt to remove material out of protected area. systems served by master box.	132258	10/30/1996	Minor
(ORO-LMES-Y12NUCLEAR-1996-0019)				
N/A	ES Technical Assessment Group finding on Radiological Protection Program implementation. Individual entered area without respirator. Two individuals signed wrong Radiological Work Permit (RWP). Three persons not on bioassay program as required.	132442	10/16/1997	Minor
		132993	06/18/1997	Minor
(ORO-LMES-Y12NUCLEAR-1996-0027)	Personnel Contamination	132994	03/17/1997	Minor
(ORO-LMES-Y12SITE-1996-0045)	OSR Violation in Building 9204 4. Vacuum gauge left in fissile material work station.	133546	06/02/1997	Minor
(ORO-LMES-Y12NUCLEAR-1997-0011)	OSR Violation in Building 9204 2. Empty shipping container uprighted without entering LCO.	133547	06/02/1997	Minor
(ORO-LMES-Y12NUCLEAR-1997-0012)	Wood pallets found in Building 9204 4 in violation of authorization basis documents.	133602	06/03/1997	Minor
(ORO-LMES-Y12SITE-1996-0046)				
N/A	Radiological Protection Program deficiencies - LMES-Wide (Bioassay, RWP Training)	134210	10/01/1997	Minor
N/A	Personal Nuclear Accident Dosimeters at Y-12 – Request for Exemption	132763	09/11/1997	Minor

Table B.2 - Open Potential PAAA Noncompliance Action Plans

NTS Number	Description	Internal Issues	Scheduled Closure	Significance Level
		Number	Date	
NTS-ORO-LMES-Y12NUCLEAR-1997-0003 (multiple)	Potential Adverse Trend in CAAS. Since May 1996, 18 events have occurred related to the CAAS.	134304	Plan under development	Significant
NTS-ORO-LMES-Y12NUCLEAR-1997-0002 (ORO-LMES-Y12NUCLEAR-1996-0026)	Unreviewed Safety Question in Building 9/20-12. Inconsistencies between facility configuration and existing safety documentation.	133612 132252	05/30/1998 01/31/1999	Significant Minor
(ORO-LMES-Y12NUCLEAR-1996-0020)	OSR Violation in Modular Storage Vault. Corrected CSA noncompliance prior to entering LCO.	133956	Plan under	Minor
(ORO-LMES-Y12NUCLEAR-1997-0004)			development	

Appendix C
Detailed Status Report on Issues Management Action Plans

Table C.1 – Closed Issues Management Priority Issues Action Plans

Description	Internal Issues Number	Closure Date
Radiological Protection Postings	I32937	09/15/1997
Dikes	I27763	07/15/1997

Table C.2 – Open Issues Management Priority Issues Action Plans

Description	Internal Issues Number	Scheduled Closure Date
<p>Configuration Management A plan has been submitted to DOE. The effectiveness of this plan needs to be monitored as implementation of the plan progresses.</p>	I30302	09/01/1998
<p>Document Control</p>	I29557	04/19/1998
<p>Facility Specific Emergency Planning Not all facilities have completed facility hazards assessments, facility-emergency planning, and self-assessments as required. Only a few additional examples of this issue were identified in the last year. However, the overall effectiveness of this plan needs to be monitored as implementation of the plan progresses.</p>	I30357	01/30/2000
<p>Fire Protection Program The Fire Protection Program has major programmatic weaknesses that need to be addressed. The current plan is 40 percent¹ complete and is behind schedule. The effectiveness of this plan needs to be monitored as implementation of the plan progresses. DOE has requested that the plan be revised to reflect the current projected completion date.</p> <p>Several subtrends have been identified. Plans are in place to address these concerns. Also see I31820 and I15113.</p>	I30299	01/15/1998
<p>Work Process Control Some ongoing work activities are not consistent with safe work practices nor conducted in accordance with established procedures. A plan was transmitted to DOE outlining initial actions needed to pilot a fix. A plan has been finalized for this issue. The effectiveness of this plan needs to be reviewed when implementation is complete.</p>	I32908	10/30/1997

¹ Percentage of completion is as of March 1997, the issuance date of the Issues Management Report.